

**CLAIMS**

1.- A Chemical process for recycling PET wastes, the process comprising the stages of: a) a saponification reaction stage, wherein PET waste particles are reacted with stoichiometric or excessive amounts of a strong base metal in an alcoholic reaction media, where the reaction is brought to the boiling temperature of the alcoholic reaction media, thereby obtaining as reaction products a salt of terephthalic acid with base metal and ethylene glycol, the latter being incorporated to the alcoholic reaction media; b) a separation stage of such terephthalic acid salt from the alcoholic reaction media; c) a terephthalic acid formation stage, wherein from terephthalic acid salt of stage (b) terephthalic acid is obtained, reacting said salt with a stronger acid than terephthalic acid to form and precipitate the latter as crystals; d) a solid-liquid separation stage, wherein precipitated terephthalic acid in stage (c) is separated from the media where it was crystallized; and e) an ethylene glycol recovery stage, wherein ethylene glycol and the alcoholic reaction media are separated and recovered from the reaction media separated in stage (b).

2.- The chemical process for recycling PET wastes of claim 1, wherein the PET waste particles are obtained from any source such as used beverage bottles and packages, and in any known shape, i.e. as fiber, film and the like.

3.- The chemical process for recycling PET wastes of claim 1, wherein the saponification reaction stage is performed at atmospheric pressure.

4.- The chemical process for recycling PET wastes of claim 1, wherein the base employed in the saponification reaction stage is selected from the group consisting of alkaline metal hydroxides or alkaline-earth metal hydroxides.

5.- The chemical process for recycling PET wastes of claim 4, wherein the base employed is sodium hydroxide (NaOH) or potassium hydroxide (KOH).

6.- The chemical process for recycling PET wastes of claim 1, wherein the alcoholic reaction media in the saponification reaction stage is essentially composed by: a mono- or polyhydric alcohol, a mixture of monohydric alcohols, a mixture of polyhydric alcohols or a mixture of mono- and polyhydric alcohols.

7.- The chemical process for recycling PET wastes of claim 6, wherein the alcoholic reaction media is comprised of a monohydric alcohol selected from alcohols with 1-8 primary, secondary or tertiary, lineal or branched carbon atoms or a mixture thereof.

5           8.- The chemical process for recycling PET wastes of claim 7, wherein the alcoholic reaction media is a 20:80 v/v methanol/ethanol mixture.

9.- The chemical process for recycling PET wastes of claim 1, wherein when the alcoholic reaction media is immiscible in water, the separation stage (b) of terephthalic acid salt comprises the following stages: i) cooling the  
10 reaction mixture to a temperature below 90°C; ii) adding sufficient water to the reaction media in order to dissolve the terephthalic acid salt, thereby obtaining two phases, namely an aqueous phase where the terephthalic acid salt is dissolved, and an organic phase that consists of the alcoholic reaction media in which ethylene glycol is incorporated; and iii) a liquid-liquid separation phase, wherein  
15 the aqueous phase containing the terephthalic acid is separated from the organic phase; wherein said separated aqueous phase undergoes stage (c) to form terephthalic acid, whereas the separated organic phase undergoes the stage (e) for ethylene glycol recovery.

10.- The chemical process for recycling PET wastes of claim 1,  
20 wherein when the alcoholic media is miscible in water, the separation stage (b) of the terephthalic acid salt comprises the stages of: i) optionally cooling down the reaction mixture of stage (a) of the saponification reaction; ii) filtering the reaction mixture to separate the crystals of the terephthalic acid salt formed from the alcoholic reaction media where ethylene is incorporated therein; and iii) washing  
25 crystals separated with an organic solvent to remove alcoholic media and ethylene glycol residues that might be embedded in the terephthalic acid salt; wherein the separated terephthalic acid salt undergoes the (c) formation stage of terephthalic acid, whereas the alcoholic media where ethylene glycol is incorporated undergoes the (e) recovery stage thereof.

30           11.- The chemical process for recycling PET wastes of claim 10, wherein the organic solvent is selected from methanol, ethanol, acetone, dichloromethane and chloroform.

12.- The chemical process for recycling PET wastes of claim 1, wherein in stage (c) of terephthalic acid formation, concentrated sulfuric acid or  
35 hydrochloric acid are employed until an acidic pH is achieved of the media where this reaction takes place, thereby precipitating terephthalic acid crystals.

13.- The chemical process for recycling PET wastes of claim 1, wherein in stage (d) of solid-liquid separation, terephthalic acid crystals are separated from the media where they were crystallized through a filtering process and then washed and purified.

- 5            14.- The chemical process for recycling PET wastes of claim 1, wherein in stage (e) of ethylene glycol recovery, the alcoholic reaction media where ethylene glycol is incorporated undergoes a distillation process , thereby separating and recovering ethylene glycol from the alcoholic reaction media.